APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
09/172,389	10/14/98	LARSON	R 10981013.1

WM02/0207

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EXAMINER
NGUYEN, K

ART UNIT	PAPER NUMBER
2671	7

DATE MAILED:
02/07/01

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary	Application No.	Applicant(s)
	09/172,389	LARSON, RONALD D.
	Examiner	Art Unit
	Kimbinh T. Nguyen	2671

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).

Status

1) ☒ Responsive to communication(s) filed on _06 December 2000_ .

2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) _1,4-11,14-18_ is/are pending in the application.

  4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) _1,4-11 and 14-18_ is/are rejected.

7) ☐ Claim(s) _____ is/are objected to.

8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☐ The drawing(s) filed on _____ is/are objected to by the Examiner.

11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved.

12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

  a) ☐ All b) ☐ Some * c) ☐ None of the CERTIFIED copies of the priority documents have been:

    1. ☐ received.

    2. ☐ received in Application No. (Series Code / Serial Number) _____ .

    3. ☐ received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

  * See the attached detailed Office action for a list of the certified copies not received.

14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. & 119(e).

Attachment(s)

15) ☒ Notice of References Cited (PTO-892)

16) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

17) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .

18) ☐ Interview Summary (PTO-413) Paper No(s). _____ .

19) ☐ Notice of Informal Patent Application (PTO-152)

20) ☐ Other: .

DETAILED ACTION

1.   This action is responsive to amendment filed on 12/6/00.

2.   Claims 1, 4-11 and 14-18 are pending in the application.

Claim Rejections - 35 USC § 103

3.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4.   Claims 1, 4-7, 9-11, 14-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Greene et al. (5,579,455) in view of Sudarsky et al. (6,088,035).

Claims 1, 11 and 18, Greene et al. discloses creating a Z pyramid data structure (col. 5, lines 51-52), the z pyramid data structure comprising at least first and second levels, each level comprising a plurality of regions (col. 5, lines 51-65), each region comprising subregions (col. 26, lines 38-39), each subregion corresponding to a single Z value (col. 26, lines 39-45), each region corresponding to a plurality of Z values of the region, wherein each subregion in the second level has a Z value that corresponds to a maximum Z value of a subregions in the first level (col. 26, lines 47-51), the logic comparing the minimum Z value of each primitive with the Z value of a region associated with the tested primitive to determine whether or not the tested primitive is fully

occluded (col. 26, lines 61-67); if the tested primitive is not fully occluded, the logic determine

whether or not any subregion of the region associated with the tested primitive is fully covered by

the primitive, wherein if a subregion is fully covered by the tested primitive, then the logic

determines whether or not the Z value of the covered subregion needs to be replaced with the

maximum Z value of the tested primitive (col. 19, lines 44-49, fig. 12); the logic to determine

whether the Z value of the covered subregion needs to be replaced with the maximum Z value of

the tested primitive, the logic determines whether the maximum Z value of the tested primitive is

less than the Z value (nearer than the current depth value) for the covered subregion, if the

maximum Z value is less than the Z value for the covered subregion, then the Z value for the

covered subregion is replaced with the maximum Z value (col. 19, lines 50-53); further, Sudarsky

discloses updating the potentially visible dynamic object list as previously hidden dynamic objects

become visible and hidden. It would have been obvious to one of ordinary skill in the art to

incorporate the Sudarsky's teaching into Greene's method for updating the occluded dynamic

object during the time period (on the fly), providing an improved method for displaying graphics

models which adapts visibility culling algorithms to dynamic scenes, and also minimizes the

update overhead of the model that may be potentially visible to the user.

Claims 4 and 14, Greene et al. discloses the logic maintains a coverage mask for each level

Z pyramid data structure, each coverage mask comprising a bit for each subregion of the level Z

pyramid dada associated with the coverage mask, wherein the logic determines that the maximum

Z value of the primitive is less than the value (nearer than the nearest depth) for the covered

subregion, a bit in the coverage mask associated with the covered subregion is set (col. 17, lines 26-32).

Claims 5 and 15, Greene et al. discloses all coverage mask bits corresponding to the subregions of a particular region have been set in the coverage mask associated with the first level of the Z pyramid data, a bit is set for the corresponding region in the coverage mask associated with the second level in the Z pyramid data (col. 18, lines 9-19)

Claims 6 and 16, Greene et al. discloses the bits in the coverage mask have been set for a particular region in the coverage mask, the logic replaces the maximum Z value for the particular region with the maximum Z value of the subregions associated with the particular region (fig. 19A).

Claims 7 and 17, Greene et al. discloses the logic sets the corresponding bit in the coverage mask for a next level up in the Z pyramid (col. 10, lines 8-67).

Claim 9, Green et al. discloses the tiler being in communication with a Z pyramid memory element, the Z pyramid memory storing the Z pyramid data (col. 28, lines 1-24).

Claim 10, Greene et al. discloses the Z pyramid memory is periodically updated with the pixel Z values corresponding to Z values of primitives which have been scan converted into screen coordinates, wherein the pixel level Z are used by the tiler (quadrant) to periodically reconstruct the Z pyramid data (col. 5, line 60 through col. 6, line 36).

5.   Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Greene et al.

(5,579,455) in view of Sudarsky et al. (6,088,035) and further in view of Greene et al.

(5,600,763).

Claim 8, Greene et al. (5,600,763) discloses the primitive are occlusion tested in a tiler

component of the graphics wherein the Z pyramid data is updated by the tiler on the fly as

primitives are being processed through the graphics system (col. 6, lines 29-40). It would have

been obvious to one ordinary skill in the art to include a "tiling pass" as taught by Greene,

because tiling pass (very rapidly) has culled most of the hidden polygons and inserted the

remaining polygons into the quadtree (Z pyramid).

Response to Arguments

6.   Applicant's arguments filed on 12/6/00 have been fully considered but they are not

persuasive.

With respect to Applicant's arguments, Greene (5,579,455) teaches a temporal coherence,

the technique uses the geometry that was rendered in the previous frame to construct a staring

point for the rendering of the next frame, most of the visible geometry will already be rendered

from the temporal coherence list, so the z-pyramid test will be much more effective than the first

frame without re-rendering, after rendering the new frame, updating the temporal coherence list

by checking each of the cubes for visibility using the z-pyramid test (col. 7, lines 7-13), this

procedure is similar to updating the z value on the fly; further, Sudarsky creates a temporal

bounding volume for the hidden dynamic objects and updating the occluded dynamic object during the time period (on the fly), this method for obviating redundant processing of hidden dynamic objects in successive images of the scene so as thereby to accelerate the rendering of successive images.

7.   The Group and/or Art Unit location of your application in the PTO has changed. To aid in correlating any papers for this application, all further correspondence regarding this application should be directed to Group Art Unit 2671.

8.   Any response to this action should be mailed to

Commissioner of Patents and Trademarks Office

Washington, D.C. 20231

Or faxed to:

(703) 308-9051, (for formal communications intended for entry)

Or:

(703) 308-6606 (for informal or draft communications, please label

"PROPOSED" or "DRAFT"

Hand- delivered responses should be brought to Crystal Park II, 2021 Crystal Drive, Arlington. VA., Sixth Floor (Receptionist).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kimbinh Nguyen whose telephone number is (703) 305-9683. The examiner can normally be reached on Monday through Friday From 7:30 a.m. to 5:00p.m. (EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Zimmerman, can be reach on (703)305-9798. However, in such a case, please allow at least one business day before contacting Mark Zimmerman.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the group receptionist whose telephone number is (703)305-4700.

Kimbinh Nguyen

February 5, 2001

MARK ZIMMERMAN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600